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ABSTRACT

"Preparing for Tomorrow's World" is an interdisciplinary, future-oriented program which incorporates information from the sciences and social sciences and addresses societal concerns which interface science/technology/society. The program promotes responsible citizenry with increased abilities in critical thinking, problem-solving, social/ethical reasoning, and decision-making. "Dilemmas in Bioethics" is designed to introduce senior high students (grades 10-11) to a sample of critical bioethical issues by considering moral dilemmas and knowledge of biomedical advances. This teaching guide discusses the purposes of the student module, strategies employed (focusing on the dilemma debate/discussion technique), module structure and objectives, and use of dilemmas in bioethics in the school curriculum. The module may be used as a separate unit of study, as a mini-course, or incorporated into existing subject areas, including biology, genetics, civics, history, philosophy, anthropology, health education, and family living. Discussion of the final, optional student activity (developing guidelines for human experimentation), chart indicating moral issues (as defined by Kohlberg) contained in the 12 dilemmas presented in the student material, and a bibliography on selected bioethical issues are also included. (JN)

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PREPARING FOR TOMORROW'S WORLD

Dilemmas In Bioethics

Teacher's Guide

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PREPARING FOR TOMORROW'S WORLD

Dilemmas In Bioethics

Teacher's Guide

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PREFACE

TO THE TEACHER:

We live in an exciting, rapidly changing, and challenging world—a world highly dependent upon science and technology. Our world is changing so rapidly that we sometimes fail to recognize that much of what we today take for granted as common, everyday occurrences existed only in the imaginations of people just a few short years ago. Advances in science and technology have brought many dreams to fruition. Long before today's school children become senior citizens, much of today's "science fiction" will, in fact, become reality. Recall just a few accomplishments which not long ago were viewed as idle dreams:

- *New biomedical advances have made it possible to replace defective hearts, kidneys and other organs.*
- *The first aire flight at Kitty Hawk lasted only a few seconds. Now, a little over half a century later space ships travel thousands of miles an hour to explore distant planets.*
- *Nuclear technology—of interest a few short years ago because of its destructive potential—could provide humankind with almost limitless supplies of energy for peace-time needs.*
- *Computer technology has made it possible to solve in seconds problems which only a decade ago would require many human lifetimes.*
- *Science and technology have brought us to the brink of controlling weather, earthquakes and other natural phenomena.*

Moreover, the changes which we have been experiencing and to which we have become accustomed are occurring at an increasingly rapid rate. Changes, most futurists forecast, will continue and, in fact, even accelerate as we move into the 21st Century and beyond. But, as Barry Commoner has stated, "There is no such thing as a free lunch." These great advances will not be achieved with a high price. We are now beginning to experience the adverse effects of our great achievements:

- *The world's natural resources are being rapidly depleted.*
- *Our planet's water and air are no longer pure and clean.*
- *Thousands of plant and animal species are threatened with extinction.*
- *Nearly half the world's population suffers from malnutrition.*

While science and technology have given us tremendous power, we are also confronted with an awesome responsibility: to use the power and ability wisely, to make equitable decision tradeoffs, and to make valid and just choices when there is no absolute "right" alternative. Whether we have used our new powers wisely is highly questionable.

Today's youth will soon become society's decision-makers. Will they be capable of improving upon the decision-making of the past? Will they possess the skills and abilities to make effective, equitable, long-range decisions to create a better world?

It is our belief that the *Preparing for Tomorrow's World* program—will help you the teacher prepare the future decision-maker to deal effectively with issues and challenges at the interfaces of science/technology/society. It is our belief that the contents and activities in this program will begin to prepare today's youth to live life to the fullest, in balance with Earth's resources and environmental limits, and to meet the challenges of tomorrow's world.

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Dilemmas in Bioethics

INTRODUCTION

Modern science and its accompanying technological advances play a dynamic role in our social, economic, political and cultural institutions. The automobile, for example, has made possible our sprawling suburbs. Television has changed the character of political campaigns. However, each new development brings with it choices and decisions, frequently ones which we have never encountered. Having no prior experiences with the effects of new choices/decisions, we cannot readily predict the range of possible effects. Additionally, who should be involved and bear the responsibility of decision making becomes a critical concern. In the past, decisions were reserved for the educated few. Yet, in our modern democracy the assumption is that the people will determine the policy. With rapid biomedical advances, the public will confront questions such as:

- Who should receive new life prolonging therapies? Those patients who can afford them?
- What medical research areas should government fund?
- Should life support systems be removed from patients in an irreversible coma?
- Who are the parents of the child conceived through artificial fertilization techniques—that is, who bears the responsibility of bringing up the child?
- Should companies be permitted to use genetic screening tests in deciding whom they hire?

The extent to which the public assumes a role in decision making depends upon its awareness and understanding of the issues and its ability to evaluate the situation and information. Moreover, policy choices, unlike a math or science problem, have no single "correct" answer. Reliance on and advice from experts also present dilemmas, for even the experts disagree. For example, the CAT scanner has been hailed for revolutionizing diagnostic radiology. It is now possible to quickly, accurately and painlessly diagnose brain conditions such as tumors, genetic defects and strokes. So significant is this machine that the inventors were recently awarded the Nobel Prize in Medicine. Nonetheless, how and when the scanner should be used is a controversial topic: How much more research needs to be conducted to confirm its safety and effectiveness? Should it be used for *any* routine screening? Will every patient be able to pay for the costly procedure; if not, who will assume the cost? Will people be deprived of easy access to a life-saving tool if they cannot pay or if it is not available locally? Will it be used indiscriminately because doctors want protection against malpractice suits?

Each new technological advance has far greater implications than is apparent on the surface. Basic issues of individual and community values and human goals become evident when one begins to probe beneath the surface. If we are to deal with the issues wisely, the importance of being well-informed and knowledgeable is clear. Thus, a firm intellectual and moral foundation becomes an important goal of educating a participatory citizenry.

The products and activities of science and medicine may perhaps have one of the most profound and drastic effects on the course of human development and evolution. Yet, like many scientific endeavors they are shrouded in an aura of mysterious and esoteric language. However, the potential effects and consequences are so formidable that it behooves educators to stimulate in students an awareness of the future implications of medical applications and the meaning they have for them as individuals and as members of the human community.

Decisions to employ new technologies and medical therapies become complicated because two major considerations are involved. In one realm there is the scientific decision. How adequate is the scientific knowledge and information? How well can effects be predicted and controlled? What risks are involved and how can they be minimized? In the other realm there are value considerations. What are the needs of society? What are the priorities of these needs? What are the short-range benefits? Long-range benefits? Do short- and long-range benefits conflict? Is there a difference between benefits to individuals and benefits to society? What trade-offs are involved and what are we willing to trade?

Since our students will be the decision-makers of the future, it is beholden upon them to begin exploring these problems and questions, integrating both technical and value elements. Value questions raised are difficult to resolve; while there may be agreement as to what values can be considered good or bad, the degree of "goodness" or "badness" of that value may vary from individual to individual as well as from one community to another. Also, new scientific knowledge may change value considerations and social customs. Bloodletting to cure fevers was a procedure used in the not too

distant past, yet today it is acknowledged as total foolishness. The Greeks left their deformed babies out to die while today corrective surgery has brought normal life for many of the physically deformed.

Decisions are further complicated by unknown effects, such as genetic defects or cancer causing chemicals, that come to light only after many future generations. How then does one know when one is making the best judgment and decisions? Are there some absolute guidelines for making medical decisions?

Insight into our value and ethical systems is a proper educational directive if the goal is to educate an informed and participating citizenry. How do we approach value/ethical considerations in the classroom? If we approach values as absolutes as in "character education," or "socialization education," do we teach that abortion is murder and therefore evil, and that the mother of a Tay-Sachs afflicted child has no choice but to give birth and watch the child die as its nervous system slowly degenerates? Or do we teach that such decisions are relative to an individual's value system, every value system having equal merit so that one cannot make judgments of another's action? If a "value free" attitude pervades, can there exist any standards to guide our actions?

We believe that wise, responsible decision making must extend beyond mere clarification of values. It must consider the impact of the decision from a wider societal perspective which recognizes and protects human rights. Advances in the field of biology and medicine will create new and challenging problems with far-reaching ethical implications. Some current and future potential issues will be explored in this module to introduce students to critical choices that will affect their future and the world in which they live.

Overview of Dilemmas In Bioethics

Purpose

The purpose of this module is to introduce students to a sample of critical issues in the area of bioethics. By posing problems and dilemmas encountered in scientific and medical applications, students will gain awareness and increased knowledge of contemporary concerns. They will also be introduced to new and future potential applications that may have significant impacts on their lives.

Moreover, they will have an opportunity to draw upon knowledge they have acquired and begin to relate ideas/concepts from the various disciplines.

Through critical analysis of the issues, examining alternative perspectives and scrutinizing potential consequences, it is anticipated that students will improve those abilities important in effective decision making, both in conducting their own lives and in their future role as active and participating citizens. They will be living in a world where many more decisions about medical science/technology will be made at all levels and sectors of society. They will have to make tomorrow's world happen—we must prepare them for that responsibility.

Strategy

The dilemma debate/discussion is the main focus of student activity in *Dilemmas in Bioethics*. Hypothetical dilemma situations are used to highlight and heighten the issues. It has been found that the dilemma discussion format can more personally involve students and demonstrates more sharply the relevancy of the issues to their lives.

It is our belief, however, that background information and some basic scientific knowledge are prerequisites to meaningful discussion. That is, discussions in a "vacuum" offer no new understandings. For each dilemma, associated readings will provide a sketch of the current types of research being conducted, methods used to obtain new knowledge, ways in which the knowledge is applied, and new choices that have become available for ourselves and future progeny. Many of the dilemma situations are adapted from actual case histories while others, though hypothetical, are possibilities of the near future. This dilemma discussion approach will require an active role on the part of the students, each having to take and defend his/her position and consider implications. In this way the level of relevancy is heightened when students can begin to understand how science and technology are a dynamic part of their lives and the present and future questions that they need to address.

The dilemmas, as presented, are simple in form but can be developed with increasing complexity depending on the intellectual and conceptual potential of the students as well as their interest and curiosity. Depending on the subject area or course, the concepts and concerns of economics, sociology, history, politics, biology, religion, etc. might be further developed. Drawing relationships from what is learned in the course will inevitably make students' learning more meaningful and applicable.

Structure of the Module

Components of Student's Manual:

- Introductory Reading
- Dilemma Story
- Samples of Student Responses
- Questions
- Culminating Activity

Dilemmas in Bioethics contains a series of twelve dilemma stories—each dealing with a critical issue concerning the application of currently available or potentially available medical/biological technology. The dilemmas are essentially brief stories that pose a critical decision to be made by the main character. Each situation is intensified to stimulate students to express their opinions and partake in the dialogue. The choice to be made revolves around the moral/ethical issues of the situation, and it is the moral/ethical implication that provide the thrust for the discussion. Within each dilemma two or more basic moral issues are in conflict. Table 4 identifies the issues emphasized in each of the dilemmas.

Although the dilemmas involve individuals, we have constructed the different dilemmas to reflect decisions having effects at the personal, community, national and global levels. In this way students can begin to expand their understanding as well as consider the implications of decisions from a variety of perspectives.

Preceding each dilemma are relevant readings or case studies to provide students with a basic background of information regarding the bioethical issue presented in the dilemma. The readings are intentionally brief so that students need not be encumbered with details. However, "pro" and "con" arguments are included to help students better understand the points of contention.

A series of questions follow each dilemma. Students should consider these questions to help them determine *why* the central character should take a particular action. The questions are also useful in guiding classroom discussion, generating additional ideas about the issue or investigating other ideas associated with the issues. The questions, in essence, are intended to stimulate thinking about the issues and have students confront ideas they have not previously entertained.

In addition, "Samples of Student Responses" accompany each dilemma. These represent some of the positions taken by typical students and the reasons they offer. They characterize different moral reasoning stages. The sample responses are useful to help stimulate controversy and engage students in the discussion. By critiquing these responses, students can begin to formulate their own ideas.

The sample responses may also be used as a basis for forming the small discussion groups. After the students have read the dilemma and the three sample responses, ask for a show of hands—for example, those who agree with "Bob's response," "Carl's response," or "Jane's response." Students who make the same selection can then be grouped together to discuss their reasons for that choice. The arguments presented in the sample responses serve as a focal point from which students can develop additional arguments.

Or, groups may be formed based upon students selecting the sample response they disagree with most strongly. In this case, the group members will provide counter arguments to the response selected.

The dilemmas as presented are simple in form but can be further developed by the teachers with increasing complexity, depending upon the intellectual and conceptual level of the students as well as their interest and curiosity. The subject area or course(s) in which this module is taught will determine the ways in which many of the concepts might be further developed. Drawing relationships from what is

TABLE 4
Issues Contained in Each Dilemma

Dilemma	*Issues**								
	punishment/ blame	property	affiliation role	law	life	truth	governance	civil rights/ social justice	morality/ mores
Needed: A New Kidney - Who Decides What?			X		X			X	
The Line-Up for a Kidney Machine - You Decide!		X			X			X	
Trying Out New Drugs: Would You Volunteer?	X						X	X	
Research on the Fetus: Should We or Shouldn't We?				X	X			X	
A New Personality for the Patient?	X		X						X
How Will the Information be Used?	X					X		X	
The Patient Refused Treatment					X			X	X
To Know or Not to Know				X		X		X	X
Is There a Need to Improve on Nature?					X		X	X	X
The Child Could be Saved . . . But Against the Wishes of the Parents			X		X				X
Babies Made to Order	X	X						X	
A New Cure from Redesigned DNA		X		X			X		

*These basic moral issues as identified by Kohlberg comprise the underlying elements of a conflict situation involving a moral decision. Our dilemmas were constructed to incorporate two or more of these issues. Dilemma resolution requires a choice or action to be made between conflicting issues. For instance, in a dilemma dealing with the issue of governance and social justice, the questions surrounding the issue of governance include: 1) should one accept or reject the authority of the governing body? 2) What are the characteristics and responsibilities of good government? The social justice issue raises the questions: 1) Should one defend or violate the political, social and economic rights of another person? 2) What are the bases of these rights?

learned in the course will inevitably make students' learning more meaningful and applicable.

As a culminating activity for the module, students have an opportunity to develop their own set of guidelines for science research and medical applications. Their considerations should include how these guidelines serve to protect human subjects and whether the extent of protection is sufficient. What changes do they believe are needed, if any? This activity should provide opportunity for the students to project into the future, develop their ideas on what is desirable and necessary, and examine and reflect on their concepts of man and human nature.

Objectives of Module

- To increase students' knowledge of societal issues in the area of bioethics.
- To increase students' ability to analyze issues related to biological/ medical science application.
- To increase socioscientific reasoning ability of students.
- To increase the decision-making skills of students on bioethical issues by considering a range of alternative solutions.
- To increase students' awareness of potential conflict of interests in the application of biological/ medical technology.
- To increase students' understanding of such concepts as resource allocation and scarcity, biological control (heredity, mutation), physiological functions and interactions, organ function and transplantation, government controls, justice, life and society's increasing ability to impact upon the operation of these concepts.
- To increase students' ability to recognize future problems in biological/ medical applications.
- To increase students' ability to develop and present effective arguments in a logical and comprehensive manner.
- To increase students' understanding of the influence and importance of science and technology in their lives.
- To enable students to more critically examine their value systems.
- To enable students to effectively integrate technical and social aspects of biological problems.
- To increase students' self-esteem and ability to communicate and function more effectively in classroom discussions.

Dilemmas in Bioethics in the School Curriculum

This module designed for the senior high grades (grades 11-12) has been used in a variety of subject area courses. These courses include biology, genetics, civics, history, philosophy, anthropology, health education and family living. In a civics course the concepts of law and social justice can be explored from the perspective of new developments where there are currently no laws or where laws are conflicting and ambiguous. For example, the legal definition of death has

been an issue in organ transplantations, because new medical developments have made it possible to maintain a potential donor's heartbeat, provide artificial respiration, etc. In another situation, Boston doctors were brought to court and charged under an 18th Century statute with "grave robbing" because they were studying the effects of antibiotics on aborted fetuses. While a civics class would focus the discussion on the legal aspects, a health course might raise such questions as: "How can one optimize the conditions for insuring the birth of a normal, healthy child?" "What constitutes the definition of normal?" "How are fetuses affected by antibiotics?" These are only a few examples of the range of possibilities available for relating dilemma discussion to existing course curriculum.

The dual purpose of this module is to confront moral dilemmas and to gain insight into biomedical advances—both of which are necessary for effective decision-making and problem solving in society today and in tomorrow's world. Nonetheless, this module is designed with flexibility in mind. While a "recommended approach" is provided in this teacher's manual, the module can be used in a variety of ways. For example, all of the dilemmas may be presented as a single, continuous activity unit spanning several class periods, or the dilemmas can be interspersed throughout an existing course of study. All of the dilemmas may be used or a portion used. The dilemmas may be assigned to all students or divided among small groups of students. The module is intended to provide another dimension to the existing course or to "stand on its own" as a self-contained unit.

These dilemmas can also serve as a "springboard" for teachers to develop different dilemmas for their classes. It is often the case that some of the best dilemmas are developed spontaneously from the materials that are part of the ongoing coursework. Having used these dilemmas, teachers can better understand the intent and value of dilemma discussions and begin to recognize other problematic situations that confront society. The question of relevancy and meaning can be bridged when specific information is related to its impact on students' lives and more global effects on the future of humankind.

All important in this strategy is to engage students in the considerations of problems and new concerns that arise from this age of science and technology. How to best apply our new knowledge requires great wisdom which educators can nurture and develop in the classroom.

Culminating Activity (Optional)

Student Development of Guidelines for Medical Research and Medical Application

After completing this module you might want to try this activity. This final activity provides a mechanism for students to put some of the ideas and judgments that have emanated from the dilemma discussions into a larger structural framework. The concerns of each of the dilemmas can be focused on a wider dimension and tied together under a series of prescriptive statements on how society ought to act. It further requires students to project into the future and summarize the implications of science and medicine on human society. "What kind of society do we want for the future?" "What ethical guidelines do we need to achieve this?"

The guideline statements can be developed by the class as a single group, in small groups, or as an assignment for each student. Alternatively, the class might be divided into small groups, each selecting a section to develop.

The guidelines may be written for one or more areas of concern. The following is a sample outline for the area of human research and includes some introductory questions. However, it is expected that during the course of the dilemma discussion students have formulated some ideas about preferred types of actions/behaviors.

The exercise can be more or less extensive. It may simply consist of a series of short statements but should reflect some in-depth thinking on the part of the student.

Guidelines for Human Experimentation

Consideration might include the following:

- *Permissible types of research*

  How much risk can be taken?

  How can we justify the need to advance knowledge? to benefit patients? to protect society from devastating diseases?

  How does one distinguish between an experiment and therapy? (e.g., first heart transplant case)

- *Selection of subjects*—

  How will researchers get volunteers?

  Can children, prisoners, soldiers, dying patients or the mentally retarded be considered for experimentation?

- *Consent*—

  On what basis should a subject consent to the experiment?

  How much information should be given the subject? (e.g., in drug testing, control groups are needed to compare effectiveness of treatment; knowledge of whether one takes the test drug or not could influence the psychological response of the patient)

  How can one be certain that the subject understands what procedures are to be performed and the associated risk? Will they withdraw from the experiment if they have knowledge of the possible consequences?

- *Regulating research*—

  Who should oversee the research project and insure that it conforms to established guidelines?

- *Responsibility*—

  Who should be responsible for unforeseen side effects?

  What constraints and safety measures are needed?

  What is the patient-doctor relationship if the subject is the patient of the researcher? (e.g., doctor wants to try a new lifesaving technique that is yet to be proven effective)

Other topics for policy guidelines might include: Research on the newborn, Genetic screening, Genetic engineering, Treatment to prolong life of the dying, Tissue and organ transplantation, Allocation of limited life saving therapy, *In vitro* fertilization.

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